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<p>(54) Title: METHOD AND DEVICE IN THE FORMING OF A LEAD-IN STRIP IN A PAPER/BOARD MACHINE</p> <p>(57) Abstract</p> <p>The invention concerns a method and an equipment in the forming of a lead-in strip (A) in a paper/board machine. In the method, two cutters (C<sub>1</sub>, C<sub>2</sub>) are used, of which at least one cutter (C<sub>2</sub>), which is brought into connection with the web from outside the web, is a liquid cutter, preferably a water cutter. In the method, by means of the first cutter (C<sub>1</sub>) a first cut (f<sub>1</sub>) is made, and by means of the second cutter (C<sub>2</sub>) a second cut (f<sub>2</sub>) is made into the paper/board web (W). In the method, the cutting jet (U<sub>2</sub>) of said second cutter (C<sub>2</sub>) is passed into connection with the web (W) from outside the web, in which connection an edge strip (B) is formed alongside the lead-in strip (A). The edge strip (B) has a sharp tip (100), in which case no notch or tail is formed into the lead-in strip (A), which notch or tail might reduce the strength of the lead-in strip (A).</p>			
<p>into the pulper</p> <p>t<sub>1</sub></p> <p>100</p> <p>f<sub>1</sub></p> <p>f<sub>2</sub></p> <p>A'</p> <p>A</p> <p>C<sub>1</sub></p> <p>C<sub>2</sub></p> <p>B</p> <p>Second cut is started and the band is blown into the basement</p>			

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Method and device in the forming of a lead-in strip  
in a paper/board machine

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The invention concerns a method and a device in the forming of a lead-in strip in a paper/board machine.

10 In prior-art solutions, a narrow strip is cut from the edge of the web, which strip is blown or transferred by means of other devices into the rope track running alongside the web in between the two ropes provided in said track. The rope track guides the web further through the machine, after which, in said cutting position, the web R can be widened to its original web width.

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In a prior-art device, in particular in connection with coating stations, it has been a problem that, by the effect of air flows and partly also by the effect of spreader rolls, the lead-in strip tends to get out of the machine and collides, e.g., against the rope draw devices. Said phenomenon, of course, increases the time of threading and 20 lowers the efficiency of the paper machine.

Various double cutters are known in connection with handling of a paper/board web. Solutions of said sort are, for example, the following:

25 From WO 92/06913 and from US 5,360,179 it is known to use water cutting at a reel-up for cutting the web and for forming a new end during a change of reel.

In particular WO 92/06913 instructs that the cutting be started in the middle of the web. As further prior-art publications can be stated EPO 067,051, WO 91/03359 and 30 US 5,234,544.

In the present patent application, it is suggested that a method of formation of a lead-in strip is used in which a double cutter is used, which comprises two cutters either in the same position or in different positions. At least one of the cutters, which starts the cutting from outside the web, is a liquid cutter. In the commonest embodiment 5 of the invention, the first cutter can also be a cutter other than a liquid cutter. Preferably both cutters are liquid cutters, most appropriately water cutters. In the method in accordance with the invention, by means of the first cutter  $C_1$ , first a lead-in strip A is formed. After that a second cut is performed by means of the second cutter  $C_2$  at the side of said first cut, whereby an edge strip or edge band B 10 is formed, preferably so that said second cutting  $f_2$  is started from the side of the paper/board web W. When the cutting is performed in said way, the tip of the edge band B is formed sharp and thereby, further, the lead-in strip A proper becomes continuous, with no step, and thereby the risk of its being broken is avoided. Said edge band B can be passed into the pulper at a suitable location. After this, the lead- 15 in strip A proper is spread, by means of the two cutters, preferably water cutters, towards the middle of the machine width, after which, or before said stage, spreading of the lead-in strip A to 1000...2000 mm is carried out. The spreading of the web to its ultimate width takes place by passing the cutters, preferably water cutters, out from opposite edges of the web at both sides of the machine-direction centre line 20 X of the web W.

Double cutting can be applied to threading in a paper machine in locations in which the lead-in strip cut from the edge of the web can be shifted so that it runs substantially closer to the middle or in the middle of the machine. Such locations are, for 25 example, threading from a forward dryer through a sizer / size press to an after-dryer and further through the after-dryer as well as threading from a cylinder dryer or equivalent through a coating machine.

In the concept and solution of equipment in accordance with the invention, the 30 cutters can be placed on the same beam and, thus, in the same position, or fully separate from one another. In such a case, the first cutter  $C_1$ , which performs the first cut  $f_1$  into the web, can be placed in the initial end of the dryer section, and the

second cutter  $C_2$ , which performs the second cut  $f_2$  into the web, can be placed in the final end of the dryer section below the last drying cylinder, in which case the sharp tip that has been formed into the edge band B can be passed directly from the drying cylinder, by means of guides/doctors placed in its connection, into the pulper placed below the cylinder.

When a liquid cutter, preferably a water cutter, is used, the range of pressure of the liquid, preferably water, is 50...300 bars. It can be considered to be an advantage of water cutting that the web can be cut against the wire H. In such a case, cutting of the web is possible in a dryer section with single-wire draw in cylinder gaps, for example, in a position below the last cylinder.

Within the scope of the invention, an embodiment is possible in which the paper/board machine comprises a number of water cutters, for example, in different dryer sections so that each water cutter comprises a first set of independently controllable cutting water-cut nozzle devices and a second set of independently controllable water-cut nozzle devices.

Within the scope of the invention, an embodiment is also possible in which said first cutting nozzle devices are placed in different positions, for example, so that the first cutting nozzle devices are placed in the beginning of the dryer section on the draw between the first Vac Roll and the drying cylinder  $K_1$ , and the second cutting nozzle devices are placed in the end of the dryer section below the drying cylinder  $K_n$  on the web/wire draw between the drying cylinder  $K_n$  and the Vac Roll  $S_n$ . If the cutting nozzle that performs the second cutting is placed in the dryer section in connection with the last drying cylinder  $K_n$  below said cylinder and if the cutting is started by means of said second nozzle from the edge of the web, it is an advantage obtained from said position that the sharp-tip edge band B can be passed directly from the last drying cylinder  $K_n$  into the pulper placed below said cylinder.

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In the way described above, a double cutter preferably comprises two sets of cutter nozzles. They are fitted so that their movements are synchronized with each other in

such a way that, when the so-called sharp-tip edge strip is being cut by means of one set of nozzles, the other set of nozzles is displaced at the same time in the cross direction towards the middle of the web, and the lead-in strip A proper is made wider. By means of the method and the solution of equipment in accordance with the invention, when the second cutter nozzle is brought from outside the web and when the supply of the cutting liquid is started from the area outside the web, a sharp tip is formed for the edge strip and, thus, the lead-in strip A proper is given a continuous shape with no steps. Said sharp tip can be controlled well, and it can be passed readily into the pulper after the cylinder. In such a case, since no notches and no so-called tail are present on the lead-in strip A proper, thereby the risk of breaking off arising from said points of discontinuity has been avoided. When liquid cutting in accordance with the invention is used, cutting against the wire is permitted. This is a significant advantage, because the cutter equipment can be placed in an optimal position on the wire and web draw. Thus, besides against the wire, the cutting can also take place against the wire and a cylinder.

In the commonest embodiment of the method in accordance with the invention, both the first cutter  $C_1$  and the second cutter  $C_2$  can be placed either in connection with one another in the same position in the dryer section, or said cutters  $C_1$  and  $C_2$  can be placed in different positions, in which case, in relation to the running direction of the web, the first cutter performs the first cutting in an earlier position, as viewed in the running direction of the wire. The second cutter  $C_2$  carries out the forming of the sharp-tip edge band B and, thus, of the lead-in strip A proper with no points of discontinuity in a position placed later, as viewed in the running direction of the web and the wire, for example between the last suction roll and the last drying cylinder. In such a case, the sharp-tip edge band B rises without separate auxiliary conveyor means along with the wire over the drying cylinder and is transferred into the pulper placed underneath after the drying cylinder, and in connection with said cutting the lead-in strip A is formed so that its edge becomes continuous. The lead-in strip A does not include notches, tails or any other detrimental points of discontinuity.

The method and the device in accordance with the invention are characterized in what is stated in the patent claims.

5 The invention will be described in the following with reference to some preferred embodiments of the invention illustrated in the figures in the accompanying drawings, the invention being, however, not supposed to be confined to said embodiments alone.

10 Figures 1A...1D illustrate the forming of a lead-in strip carried out by means of double water cutting step by step.

Figure 1E illustrates a prior-art method.

15 Figure 1F illustrates the method in accordance with the present invention.

Figures 2A...2D illustrate alternative positions of the double cutter in accordance with the invention both in a single-wire group of drying cylinders and in a twin-wire group of drying cylinders.

20 Figure 3 shows a double cutter in which the cutting nozzles are placed at opposite sides of a beam frame on guides of their own.

Figure 4A shows a second embodiment of a double cutter, in which both of the cutting nozzles are placed on the same guides on sledges of their own.

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Figure 4B is an illustration of principle of the solution as shown in Fig. 4A.

Figure 4C is an axonometric view illustrating the device as shown in Fig. 4A.

30 Figs. 1A...1D illustrate the different steps of cutting the lead-in strip. In the commonest embodiment of the invention, a double cutter 10 is spoken of, which comprises the cutters C<sub>1</sub> and C<sub>2</sub> in general, of which at least the second cutter C<sub>2</sub>, which

is brought from outside the web, is a liquid cutter and most appropriately a water cutter. Said second cutter  $C_2$  already starts the cutting outside the web. The cutter  $C_2$  is preferably a cutter nozzle, through which a liquid jet  $U_2$ , preferably a water jet, is applied with pressure to the face of the web  $W$  to be cut. The cutter  $C_1$  is 5 preferably also a liquid cutter and most appropriately a water cutter. In such a case, the cutter  $C_1$  is a nozzle, through which a liquid jet  $U_1$ , preferably a water jet, is applied with pressure to the face of the web  $W$  to be cut.

Fig. 1A shows the first step in the formation of the lead-in strip. The first cutter jet 10  $C_1$  performs the first cut  $f_1$ . The high-pressure liquid jet  $U_1$  is applied to the face of the web  $W$ . The lead-in strip  $A$  is blown to the rope draw.

Fig. 1B shows the forming of the second cut  $f_2$ . In accordance with the invention, the cutting jet, preferably a water jet  $U_2$ , of the second cutter nozzle  $C_2$  is brought 15 from the side from outside the web  $W$ , in which connection a sharp tip 100 is formed for the edge band  $B$ . In the embodiment shown in Fig. 1B, both the web  $A'$  adjacent to the lead-in strip  $A$  and the edge band  $B$  are passed directly from the roll  $t_1$  into the pulper. To the edge band  $B$ , a sharp tip 100 is formed, and in such a case, in the lead-in strip  $A$  proper, there are no points of discontinuity which might 20 constitute a risk of breaking of said strip.

In Fig. 1C, the lead-in strip is shifted to the middle of the web by displacing the two cutter nozzles  $C_1, C_2$  to the middle of the web width.

25 Fig. 1D shows a stage in which the spreading of the lead-in strip  $A$  to full web width is carried out.

Fig. 1E shows an old, prior-art method, in which the cut  $f_2$  starts from the vicinity 30 of the edge and the edge band  $B$  is cut off mechanically at the point  $G$ . In the band  $A$ , a notch and a tail remain, which constitute a potential risk of a break.

Fig. 1F illustrates a method solution in accordance with the invention, in which the cut  $f_2$  is started from outside the edge and the band A will have no notch or tail which might constitute a risk of a break. On the band B that is passed into the pulper, a sharp tip 100 is formed, and in such a case no detrimental points of discontinuity are formed in the lead-in strip A.

- Fig. 2A shows alternative positions  $B_1, B_2, B_3$  of the double cutters  $10a_1$  in accordance with the invention in a dryer section with single-wire draw in a paper/board machine. The dryer section comprises drying cylinders  $K_1, K_2, \dots$  and suction cylinders  $S_1, S_2, \dots$  placed below them. The drying cylinders  $K_1, K_2, \dots$  are preferably steam-heated cylinders, and the suction cylinders  $S_1, S_2, \dots$ , preferably so-called Vac Rolls, are cylinder constructions which comprise grooves on their face and holes opening into said grooves through the roll mantle from the interior of the cylinder. A vacuum is applied to the interior of the cylinders, and the web is kept in contact with the wire H face by means of the vacuum. The wire H and the web W run as meandering in loop shape from a drying cylinder onto a suction cylinder and from a suction cylinder onto a drying cylinder and further in the group of drying cylinders.
- In the embodiment shown in Fig. 2A, the double cutter  $10a_1$ , which comprises two cutter nozzles  $C_1$  and  $C_2$ , is placed in alternative positions  $B_1, B_2$  and  $B_3$ . The position  $B_1$  is placed in connection with the last drying cylinder  $K_3$  of the last dryer group  $R_n$  on the web/wire draw between the drying cylinder  $K_3$  and the suction cylinder  $S_3$ . The position  $B_2$  is in a corresponding position in the middle area of the dryer group, and the position  $B_3$  is placed in the initial end of the dryer group.

Fig. 2B shows the position  $B_4$ , in which the liquid cutter  $10a_2$  that comprises two cutter nozzles  $C_1$  and  $C_2$  is placed in the initial end of the dryer section on the web/wire draw between the first drying cylinder  $K_1$  and the first suction cylinder  $S_1$  in the dryer group  $R_n$ .

Fig. 2C shows the position  $B_5$  of the double cutter  $10a_3$  in accordance with the invention in a twin-wire dryer group on the web draw between the last drying cylinder  $K_5$  and the lower drying cylinder  $K_4$ .

- 5 Fig. 2D shows an embodiment of the invention in a group of drying cylinders, in which the first cutter  $C_1$ , preferably a cutter nozzle, of the double cutter  $10a_4$  is placed in the position  $B_6$  in the beginning of the dryer group, and in which the second cutter  $C_2$ , preferably a cutter nozzle, of said double cutter  $10a_4$  is placed in the position  $B_7$  in the end of the dryer group below the last drying cylinder  $K_3$  of the  
10 group. The run of the lead-in strip A and of the edge band B can be supported by blowing of air (ip) in the embodiments shown in this and in the preceding figures.

Fig. 3 shows a double cutter 10, which comprises a carrier and support beam 11 passing across the web and guides  $12a_1, 12a_2$  placed at both sides of said beam, on  
15 which guides the sledges that comprise the cutter nozzles are placed. The sledge  $13a_1$  is placed on the guide  $12a_1$ , and the other sledge  $13a_2$  is placed on the guide  $12a_2$ . The sledges  $13a_1$  and  $13a_2$  are displaced by means of a belt device, chain device or equivalent  $14a_1, 14a_2$ , which are engaged with the sledges  $13a_1$  and  $13a_2$ . Motors are fitted to operate said belt or chain devices.  
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Since, as is shown in the figure, the equipment comprises an arm 15 passed from the second sledge  $13a_2$  to the other side of the support beam 11 and since the second cutter nozzle  $C_2$  is fitted at the end of said arm 11, the cutter nozzles  $C_1$  and  $C_2$  are placed at the same side of the beam 11.

25 Thus, as is shown in the figure, the guides  $12a_1, 12a_2$  are placed at opposite sides of the support beam 11 extending across the machine width. In this way a sufficient space is provided for the guide constructions and for the chain drives of the related sledges  $13a_1$  and  $13a_2$ . The figure does not show the drive gear connected with the chains, such as a motor. The chain drive can be such that, by means of the motor, through its output shaft, a drive pulley is rotated, which is placed at the end of the output shaft of the motor and which operates the closed cogged chain. The end of  
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the cogged chain is connected with a reversing pulley, which is mounted on the beam 11. Each chain thus operated is connected with a sledge, in which connection the cutter nozzle C<sub>1</sub>,C<sub>2</sub> connected with the sledge can be controlled in the desired way.

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Fig. 4A shows an embodiment of a double cutter 10 in which both of the cutter nozzles C<sub>1</sub> and C<sub>2</sub> are placed on the same guide on sledges 13a<sub>1</sub>,13a<sub>2</sub> of their own. The chain devices 14a<sub>1</sub> and 14a<sub>2</sub> are coupled with their sledges 13a<sub>1</sub> and 13a<sub>2</sub> independently. The cutter nozzle C<sub>1</sub> is placed on the sledge 12a<sub>1</sub> and the cutter nozzle C<sub>2</sub> on the sledge 13a<sub>2</sub>. Through the cutter nozzles C<sub>1</sub>,C<sub>2</sub> a pressurized water jet is applied to the face of the web W. The pressure range is 50...300 bars.

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Fig. 4B shows one mode of controlling a sledge 13a<sub>1</sub> fitted on a guide 12a<sub>1</sub> by means of a chain device 14a<sub>1</sub>, which sledge includes one of the cutter nozzles, the cutter nozzle C<sub>1</sub>. On its output shaft 21 the motor 20 comprises a drive pulley 22, around which a belt, chain 23 or equivalent is passed. The belt, chain 23 or equivalent is an endless drive loop, which is passed, at the opposite end, around a drive pulley 24 fitted revolving on the beam 11. Said drive belt 23 or equivalent is further coupled with a sledge 13a<sub>1</sub>. The sledge 13a<sub>1</sub> is guided along the guide 12a<sub>1</sub>.

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Fig. 4C is a schematic illustration of sledges 13a<sub>1</sub> and 13a<sub>2</sub> mounted on the guides 12a<sub>3</sub>. The control of the sledges is carried out in a way similar to that described in relation to Fig. 4B. Thus, the chain devices 14a<sub>1</sub> and 14a<sub>2</sub> may have drive motors 20 and 200 of their own.

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In the embodiment of Fig. 4C, the nozzles C<sub>1</sub> and C<sub>2</sub> are placed on the sledges 13a<sub>1</sub> and 13a<sub>2</sub>, which are mounted on the same guide 12a<sub>3</sub>. However, the cuts f<sub>1</sub> and f<sub>2</sub> performed by said nozzles can overlap and even cross each other. This has been achieved so that on their sledges 13a<sub>1</sub> and 13a<sub>2</sub> the nozzles C<sub>1</sub> and C<sub>2</sub> have been bent/inclined towards each other.

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In the embodiment with two guides in Fig. 3, a crosswise arrangement of the cuts  $f_1$  and  $f_2$  has been permitted by the fact that the sledges  $13a_1$  and  $13a_2$  are placed on different guides  $12a_1$  and  $12a_2$ .

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## Claims

1. A method in the forming of a lead-in strip (A) in a paper/board machine, characterized in that, in the method, two cutters ( $C_1, C_2$ ) are used, of which at least one cutter ( $C_2$ ) is a liquid cutter, preferably a water cutter, out of which a pressurized water jet ( $U_2$ ) is produced in order to cut the paper/board web (W), and that, in the method, by means of the first cutter ( $C_1$ ) a first cut ( $f_1$ ) is made, and by means of the second cutter ( $C_2$ ) a second cut ( $f_2$ ) is made into the paper/board web (W), and that, in the method, the cutting jet ( $U_2$ ) of said second cutter ( $C_2$ ) is passed into connection with the web (W) from outside the web, in which connection an edge strip (B) is formed alongside the lead-in strip (A), which edge strip (B) has a sharp tip (100), in which case no notch or tail is formed into the lead-in strip (A), which notch or tail might reduce the strength of the lead-in strip (A).  
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- 10 2. A method as claimed in claim 1, characterized in that, in the method, two sets of cutter nozzles ( $C_1$  and  $C_2$ ) are used, both of which produce a pressurized liquid jet ( $U_1, U_2$ ) in order to cut the paper/board web (W), and that in the method, by means of the first cutter nozzle ( $C_1$ ), a liquid jet ( $U_1$ ) is produced, by whose means a first cut ( $f_1$ ) is made into the web (W), and by means of the second set of cutter nozzles ( $C_2$ ) a second cut ( $f_2$ ) is made into the web (W).  
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- 20 3. A method as claimed in the preceding claim, characterized in that, in the method, cutter nozzles ( $C_1, C_2$ ) are used which are placed in the dryer section of the paper/board machine, and that in the method, by means of the first cutter nozzle ( $C_1$ ), a cut is formed ( $f_1$ ) and a lead-in strip (A) is formed, and that, after this, a second cut ( $f_2$ ) is performed by means of a second cutter nozzle ( $C_2$ ) by starting the cutting from the side of the web (W), in which connection an edge band (B) is formed, which has a sharp tip (100), and that the cutter nozzles ( $C_1$  and  $C_2$ ) are transferred in the cross direction towards the middle of the web and the lead-in strip  
25 (A) is made wider, and that in this way a wide lead-in strip (A) proper is formed in the middle area of the machine, and the edge band (B) is passed readily by means of its sharp tip (100) into the pulper, and that, when the web is widened to its ultimate  
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width, the cutter nozzles ( $C_1, C_2$ ) are controlled preferably at the same time by passing them from the middle area in the direction of width of the machine towards both sides.

5     4. A method as claimed in claim 2 or 3, characterized in that the double cutter (10) has been fitted in such a way in connection with the dryer section of the paper machine that both cutter nozzles ( $C_1, C_2$ ) are placed in a group of drying cylinders below a drying cylinder ( $K_n$ ) and on the web run between the last two drying cylinders placed in the upper row.

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5. A method as claimed in any of the preceding claims, characterized in that, in the method, a liquid, preferably water, is used as the medium that cuts the web, the range of pressure of said liquid or water being 50...300 bars.

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6. A method as claimed in any of the preceding claims, characterized in that, in the method, a double cutter (10,10a<sub>1</sub>,10a<sub>2</sub>,10a<sub>3</sub>,10a<sub>4</sub>) is used whose cutters ( $C_1, C_2$ ) are placed in the same position.

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7. A method as claimed in any of the preceding claims 1,2,3 or 5, characterized in that, in the method, a double cutter (10a<sub>4</sub>) is used whose cutters ( $C_1, C_2$ ) are placed in different positions.

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8. An equipment in the forming of a lead-in strip (A) in connection with the dryer section of a paper/board machine, characterized in that a double cutter (10,10a<sub>1</sub>,10a<sub>2</sub>,10a<sub>3</sub>) is composed of cutter nozzles ( $C_1, C_2$ ), which produce a high-pressure liquid jet, preferably a water jet ( $U_1, U_2$ ) onto the face of the web (W) in order to cut the web, and that, in the construction of equipment, the nozzles have been fitted in the same position so that the cutter nozzles ( $C_1, C_2$ ) out of which the high-pressure liquid jet ( $U_1, U_2$ ) is applied to the face of the board/paper web (W) to be cut are placed in connection with the same support beam (11).

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9. An equipment as claimed in the preceding claim, characterized in that the cutter nozzles ( $C_1, C_2$ ) have been fitted on sledges ( $13a_1, 13a_2$ ) of their own, which sledges ( $13a_1, 13a_2$ ) have been fitted to move on a guide ( $12a_1, 12a_2$ ) parallel to the support beam (11).

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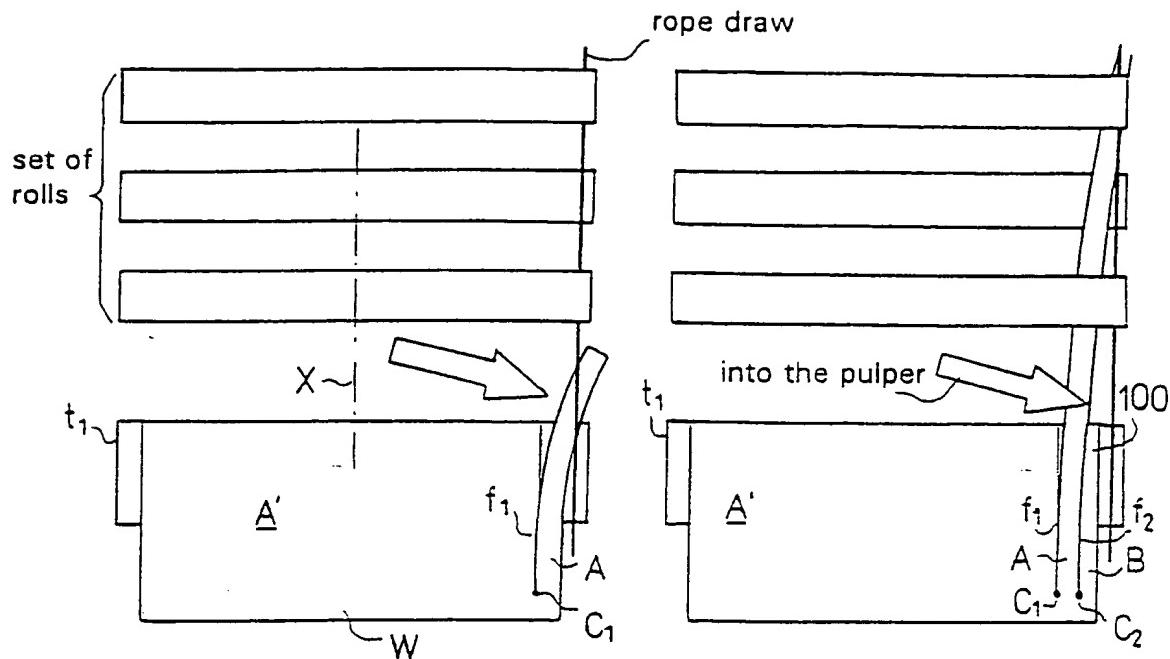
10. An equipment as claimed in any of the preceding claims 8 or 9, characterized in that the cutter nozzles ( $C_1, C_2$ ) have been fitted on sledges ( $13a_1, 13a_2$ ) which are guided on the same guide ( $12a_3$ ).

10 11. An equipment as claimed in claim 8 or 9, characterized in that the cutter nozzles ( $C_1, C_2$ ) have been fitted on sledges ( $13a_1, 13a_2$ ) which are guided on different guides ( $12a_1, 12a_2$ ).

15 12. An equipment as claimed in claim 11, characterized in that the cutter nozzles ( $C_1, C_2$ ) have been fitted on their sledges ( $13a_1, 13a_2$ ) and on guides ( $12a_1, 12a_2$ ) placed at different sides of the support beam (11), in which case a separate arm (15) has been passed from one sledge ( $13a_2$ ) across the beam (11), in which connection the cutter nozzle ( $C_2$ ) fitted on said arm has been brought to the same side of the support beam (11) as the other cutter nozzle ( $C_1$ ).

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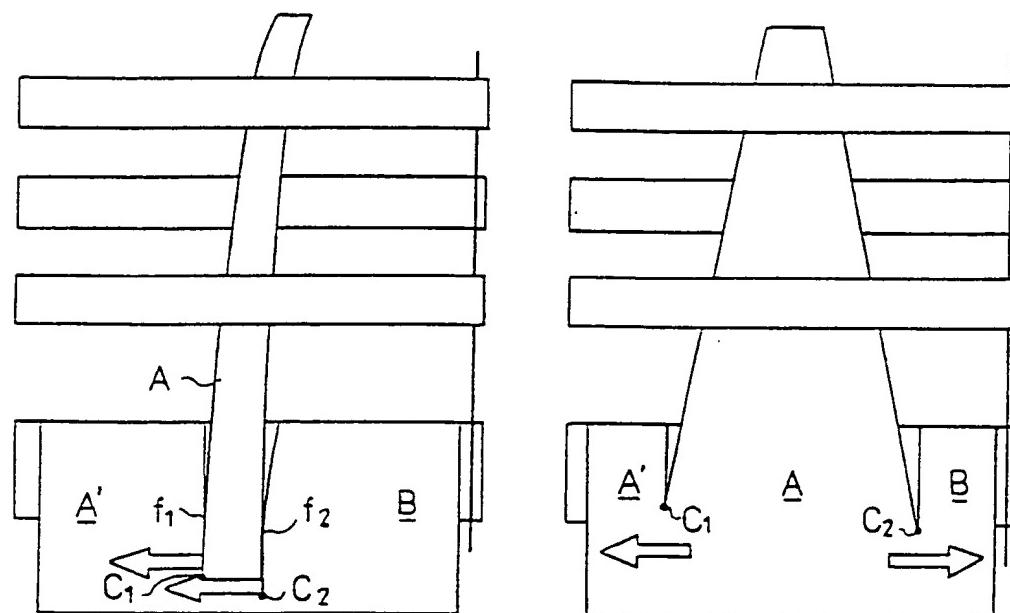


Lead-in strip is blown to the ropes

Second cut is started and the band is blown into the basement

FIG. 1A

FIG. 1B



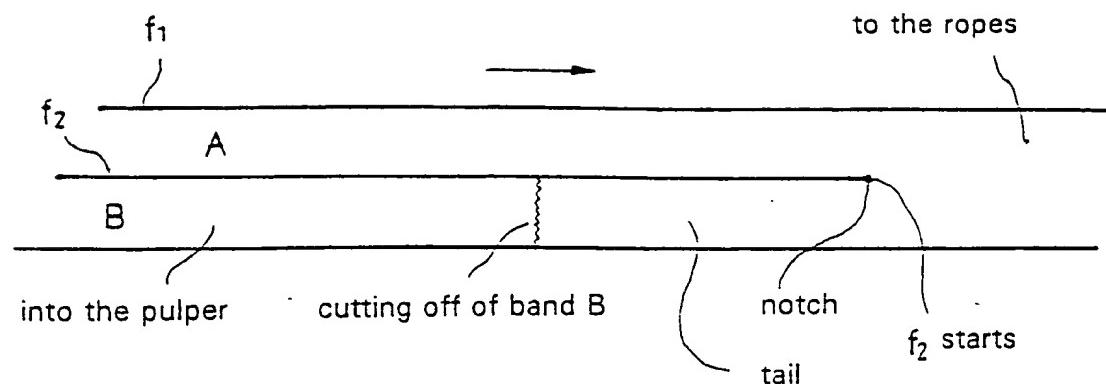
Lead-in strip is passed to the middle

Web is widened symmetrically

FIG. 1C

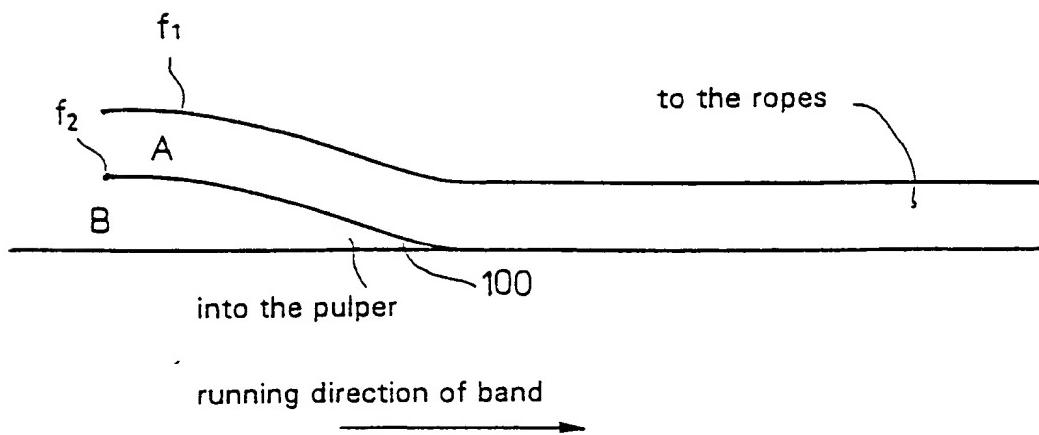
FIG. 1D

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Prior art

FIG. 1E



As per invention

FIG. 1F

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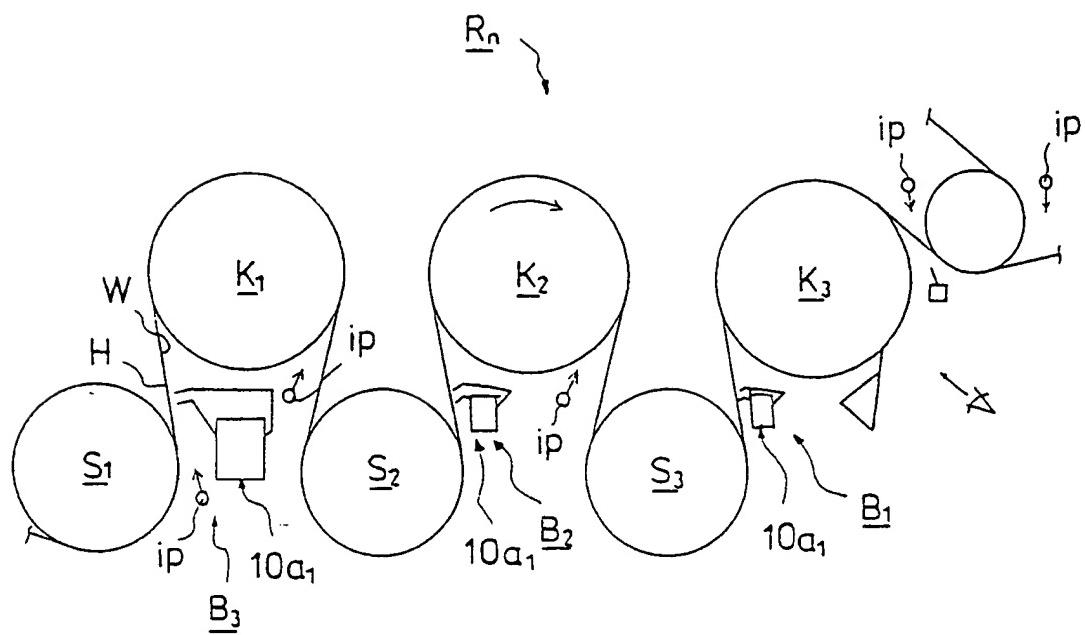


FIG. 2A

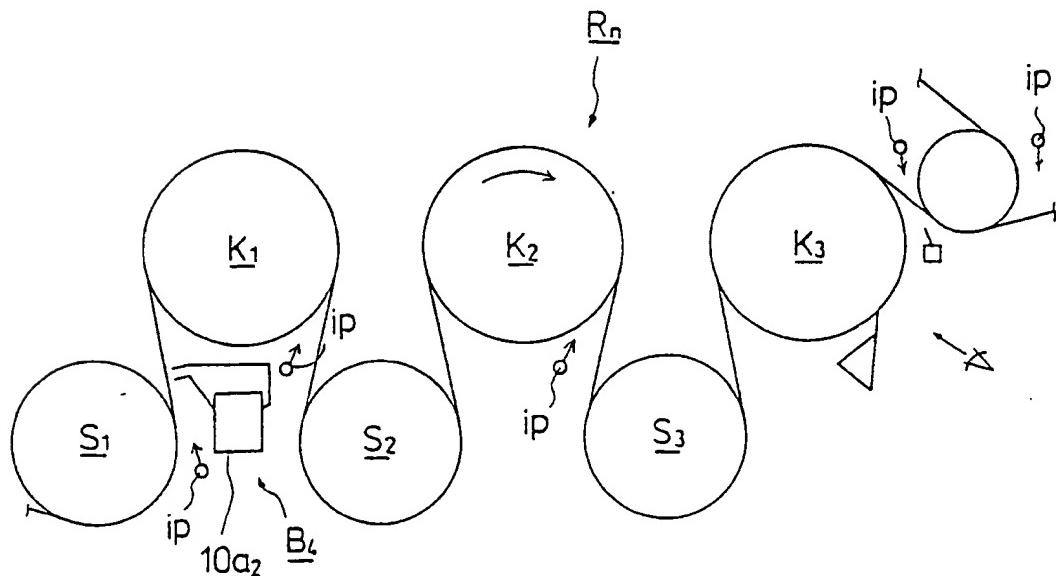


FIG. 2B

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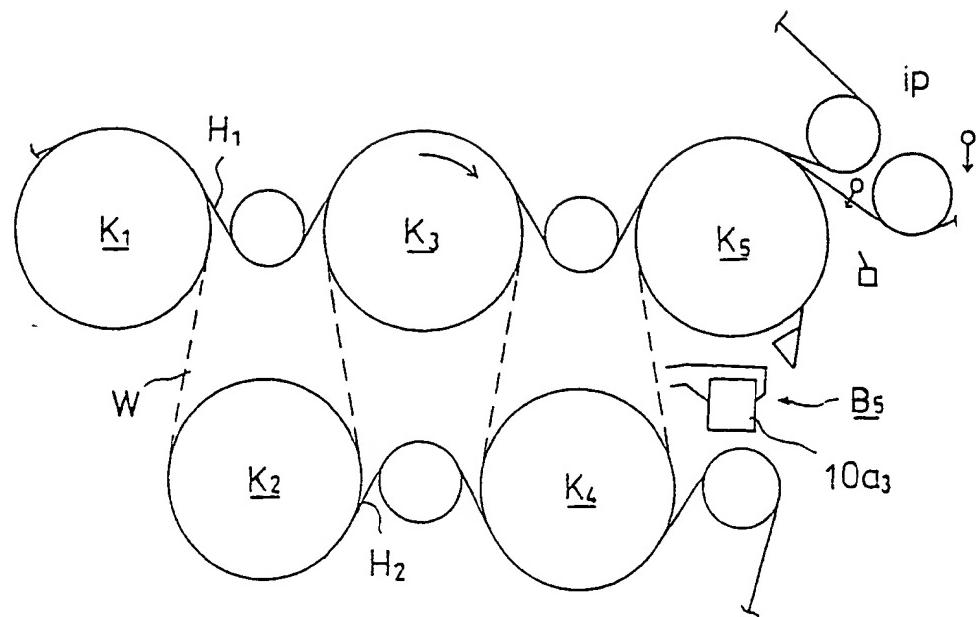


FIG. 2C

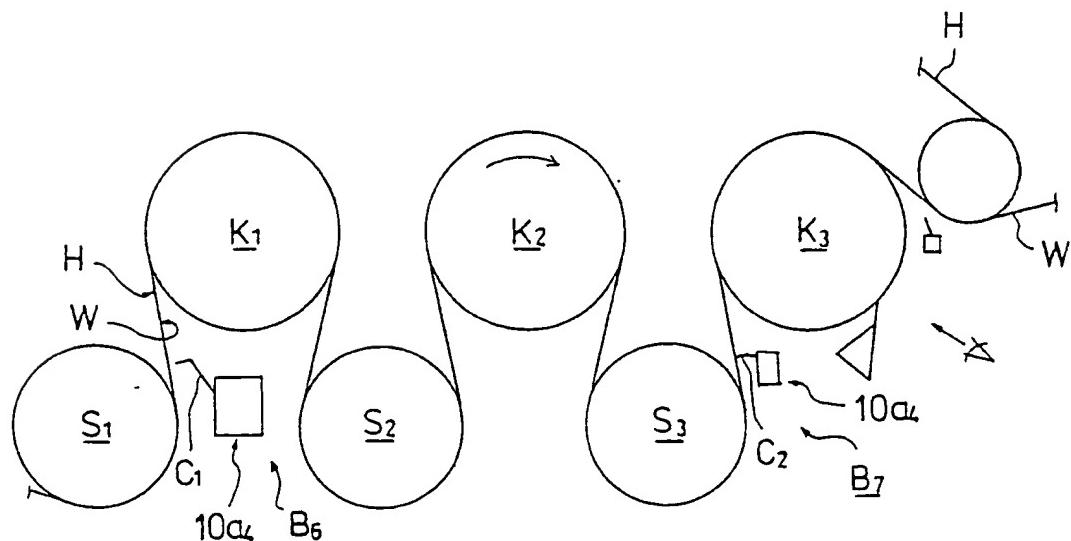


FIG. 2D

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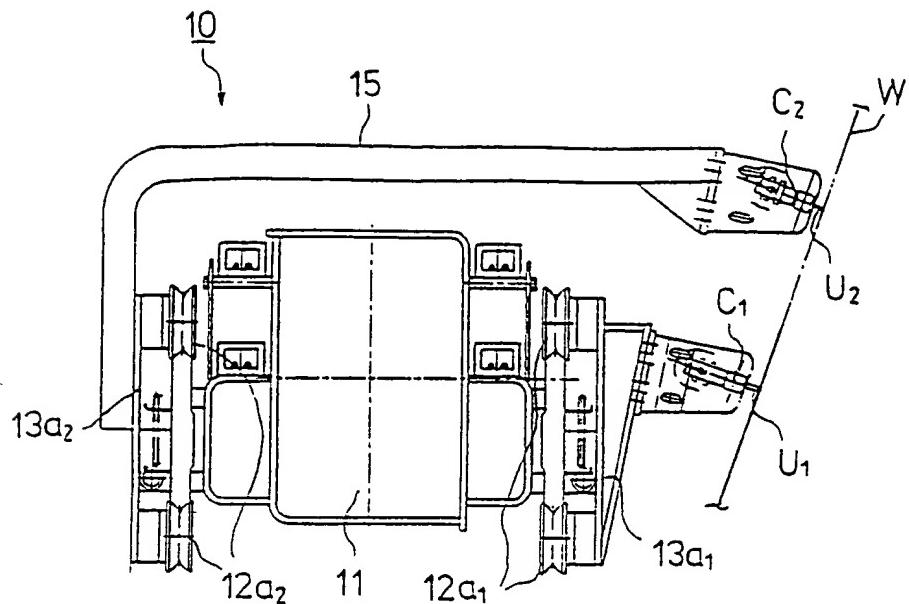


FIG. 3

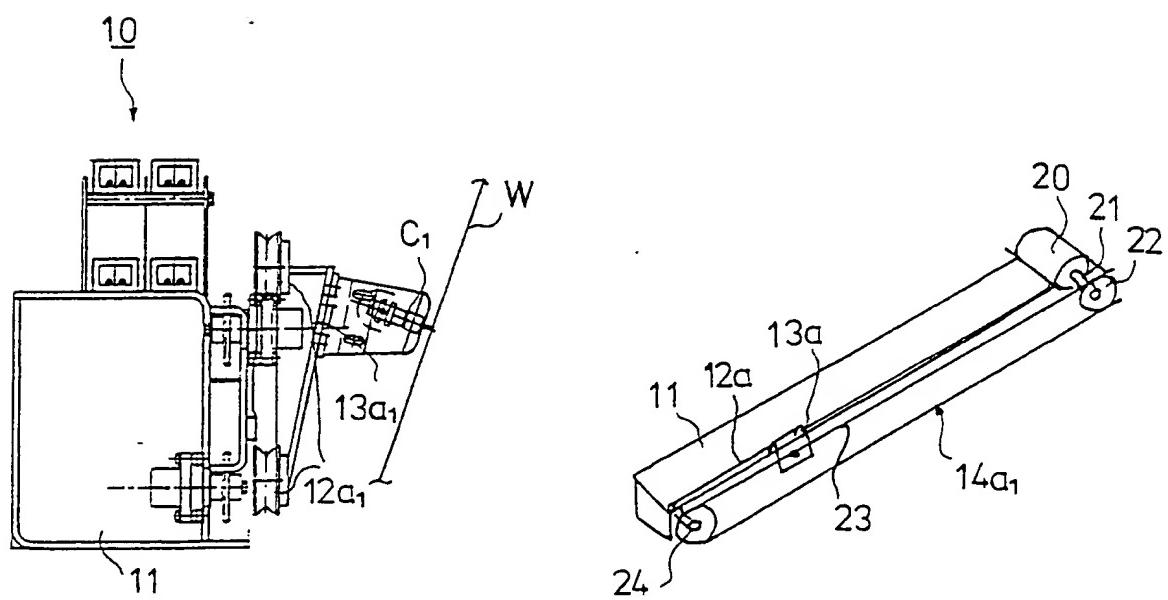


FIG. 4A

FIG. 4B

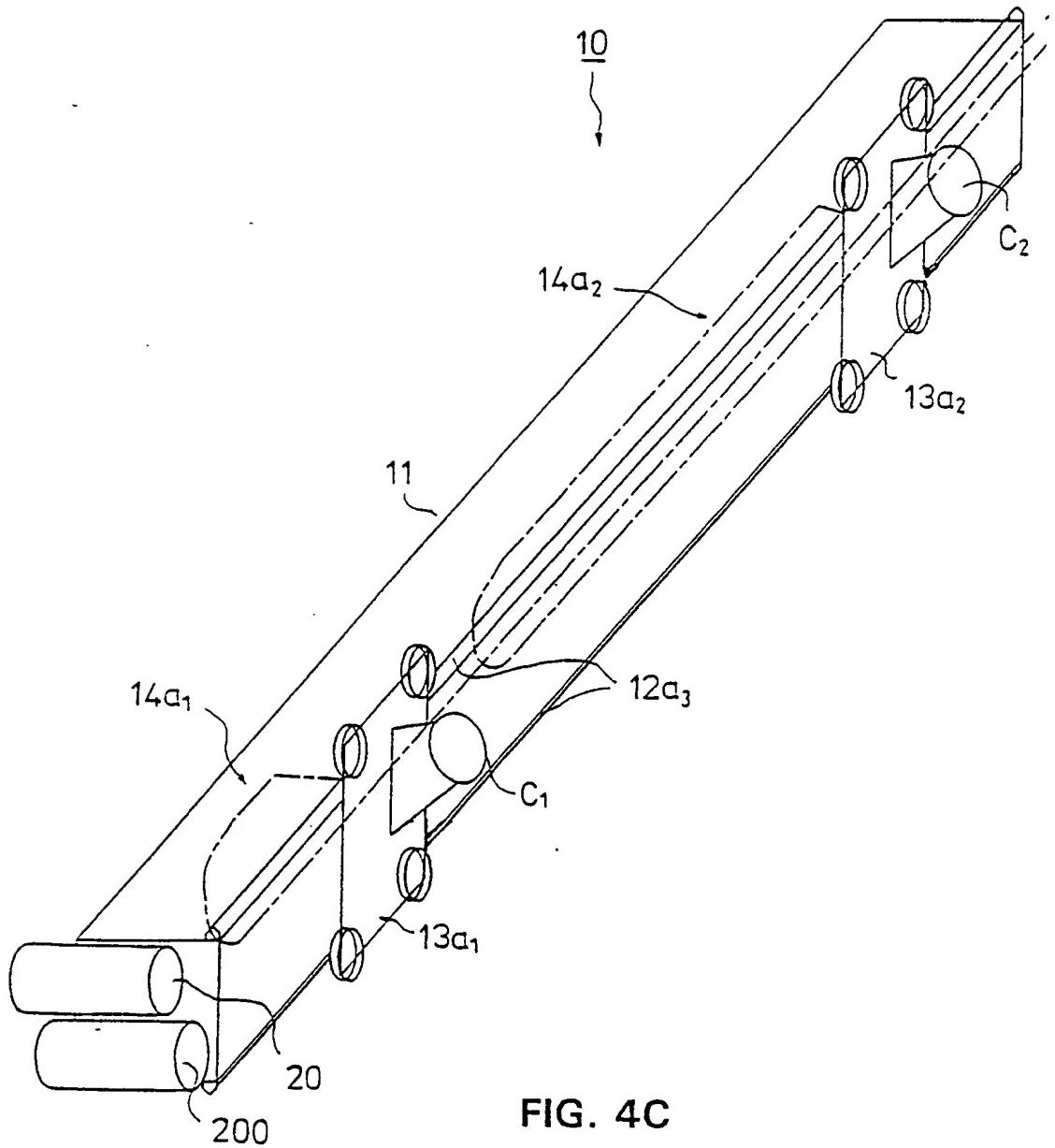


FIG. 4C

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/FI 98/00042

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC6: D21F 7/00, D21G 9/00 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: D21F, D21G		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched <b>SE,DK,FI,NO classes as above</b>		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FI 95612 B (VALMET PAPER MACHINERY INC.), 15 November 1995 (15.11.95)	1,9,11,12
X	page 4, line 27 - page 5, line 25, figures 2,3, Claim 1	8,10
	---	
A	WO 9103359 A1 (FIBRON MACHINE CORP.), 21 March 1991 (21.03.91)	1,9,11,12
X	page 14, line 17 - page 16, line 3, figures 16-21	8,10
	---	
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<input type="checkbox"/> Further documents are listed in the continuation of Box C.		<input checked="" type="checkbox"/> See patent family annex.
<p>* Special categories of cited documents</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"B" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
Date of the actual completion of the international search	Date of mailing of the international search report	
27 May 1998	28 -05- 1998	
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer  Olov Jensén Telephone No. + 46 8 782 25 00	

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

29/04/98

International application No.  
**PCT/FI 98/00042**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FI 95612 B	15/11/95	FI 944390 D	00/00/00
WO 9103359 A1	21/03/91	DE 69005829 D	00/00/00
		EP 0490906 A,B	24/06/92
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